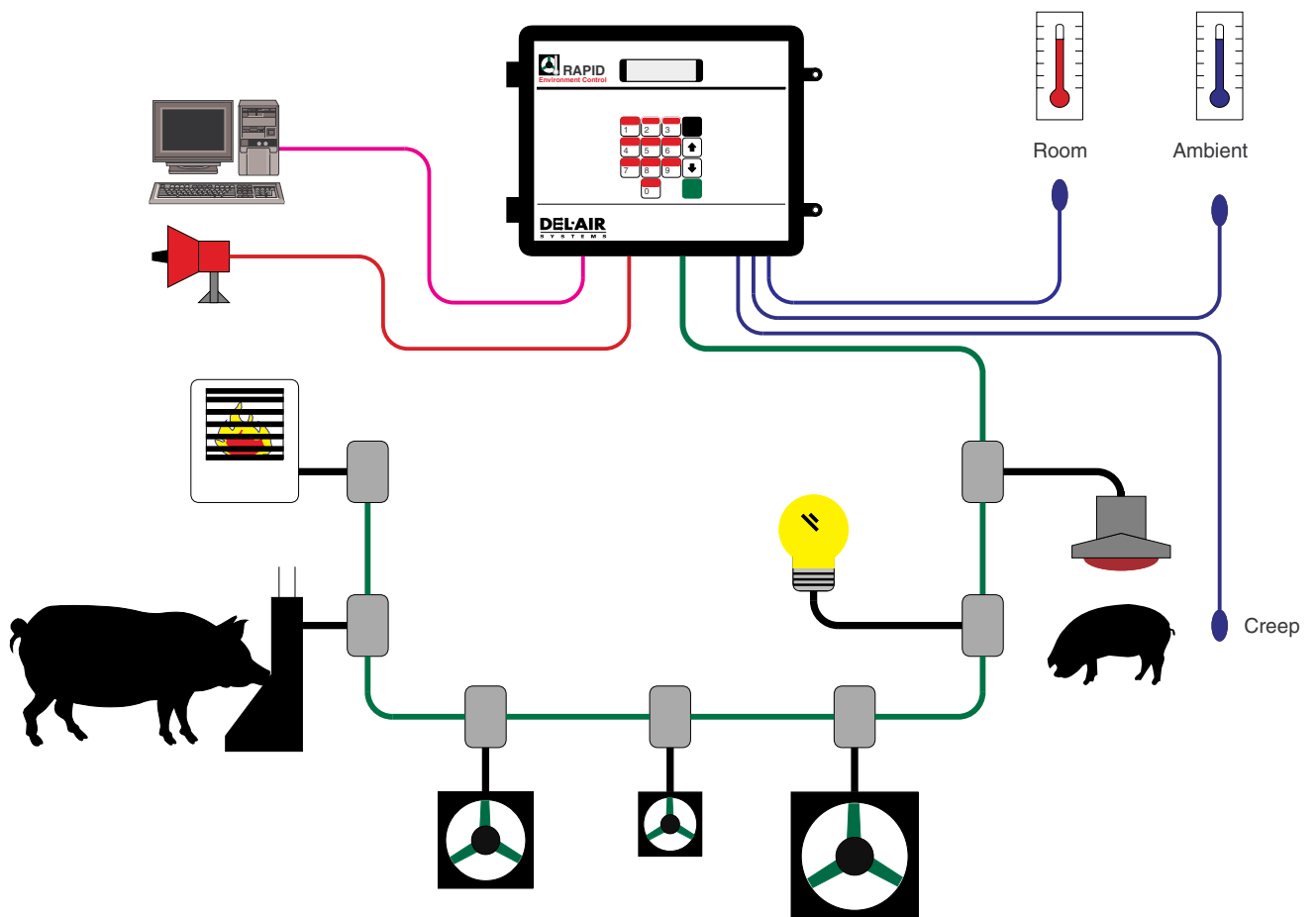


INSTALLATION GUIDE

Ver 99C



RAPID ENVIRONMENT CONTROL - INSTALLATION GUIDE

INTRODUCTION

The RAPID Control system is a distributed, networkable, 2 zone control that has been designed to simplify and economize installation. Figure 1 is a block diagram of some of the devices that can be connected to the RAPID Control. They include:

- Two Module Networks for control of many types of devices in two independent zones.
- Two Sensor Inputs per zone plus an additional Ambient Sensor¹.
- Alarm devices including a local siren or auto-dialer.
- Central PC with RAPID-PC software package (optional).

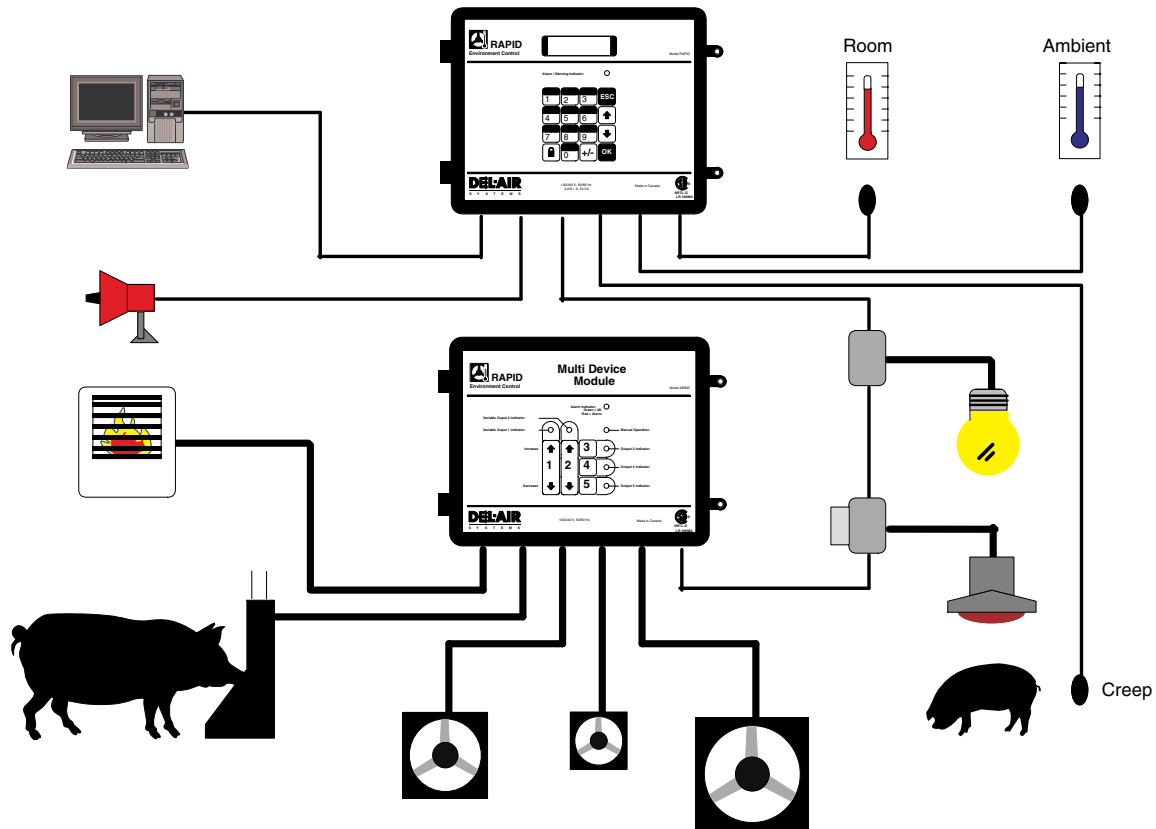


Figure 1

¹ Only one ambient sensor may be required per facility if multiple controls are networked.

WHEN THIS CONTROL IS USED IN A LIFE SUPPORT HEATING AND VENTILATION SYSTEM WHERE FAILURE COULD RESULT IN LOSS OR INJURY, THE USER MUST INSTALL A FUNCTIONING ALARM SYSTEM AND ADEQUATE BACK UP, OR ACCEPT THE RISK OF LOSS OR INJURY.

LIMITED WARRANTY

DEL-AIR SYSTEMS LTD. warrants to the original purchaser, that any device which proves to be defective under normal use within two years from date of original purchase, will be repaired or replaced without charge.

TERMS AND CONDITIONS

1. The warranty on this document does not apply:
 - a) To any product subjected to misuse, negligence, abuse, defective or improper wiring, improper installation, or any unit which has had the serial number damaged or obliterated.
 - b) To damage as a result of flood, fire, lightning, or any Acts of God.
2. Parts replaced or repaired under this warranty are warranted only through the remainder of the original warranty.
3. This warranty does not cover cost of shipping defective or repaired or replaced parts to or from original customer.
4. DEL-AIR Systems Ltd. reserves the right to make changes and improvements to its product at any time with the express understanding that such changes and improvements do not impose any obligation to install such changes and improvements on products previously sold.

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1 Pre-Installation Check

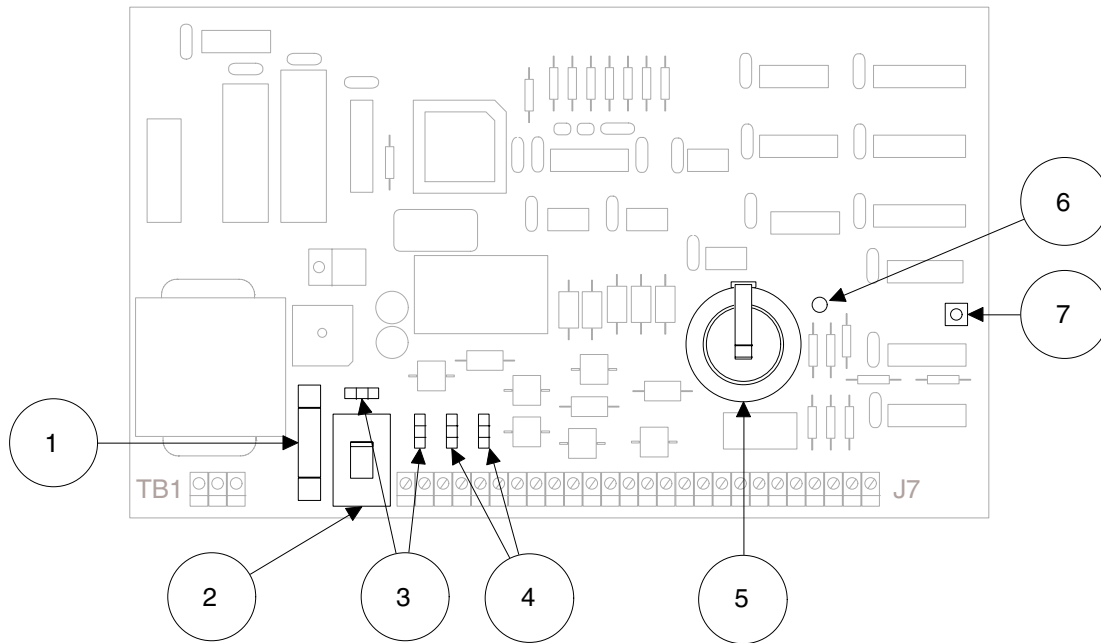


Figure 2 - RAPID Control Circuit Board

Figure 2 - RAPID Control Circuit Board displays the features on the control circuit board that are important to the installer. They include:

1. **Main Power Fuse** - Replacement: 3AG 2/10 Amp slow-blow, 250V.
2. **Voltage Selector Switch.** (See Section 2.1 Power Input)
3. **PC-Network Fuses** - Replacement: 2AG 1/8 Amp 250V
4. **Module 12V Ground Fuses** - Replacement: 2AG 1.5 Amp 250V
5. **Battery** - The RAPID Control uses a back-up battery to maintain time, date, and logs when a power failure occurs. The RAPID Control is shipped with a piece of paper under the battery clip so it will not discharge in shipping. Remove the paper after the RAPID is installed to enable the battery.
6. **DS1** - This LED will light when the RAPID Control is properly powered. If the LED is off, no power is present.
7. **RESET Switch** - This switch (S2) is used to reset the control. Please refer to the troubleshooting guide for further information.

2 RAPID Control Wiring Instructions

Figure 3 is a wiring diagram of a typical barn. To make the drawing as clear as possible only the modules for one zone are shown. If the second room were identical there would be the same modules connected to terminals 7, 8, 9 and 10.

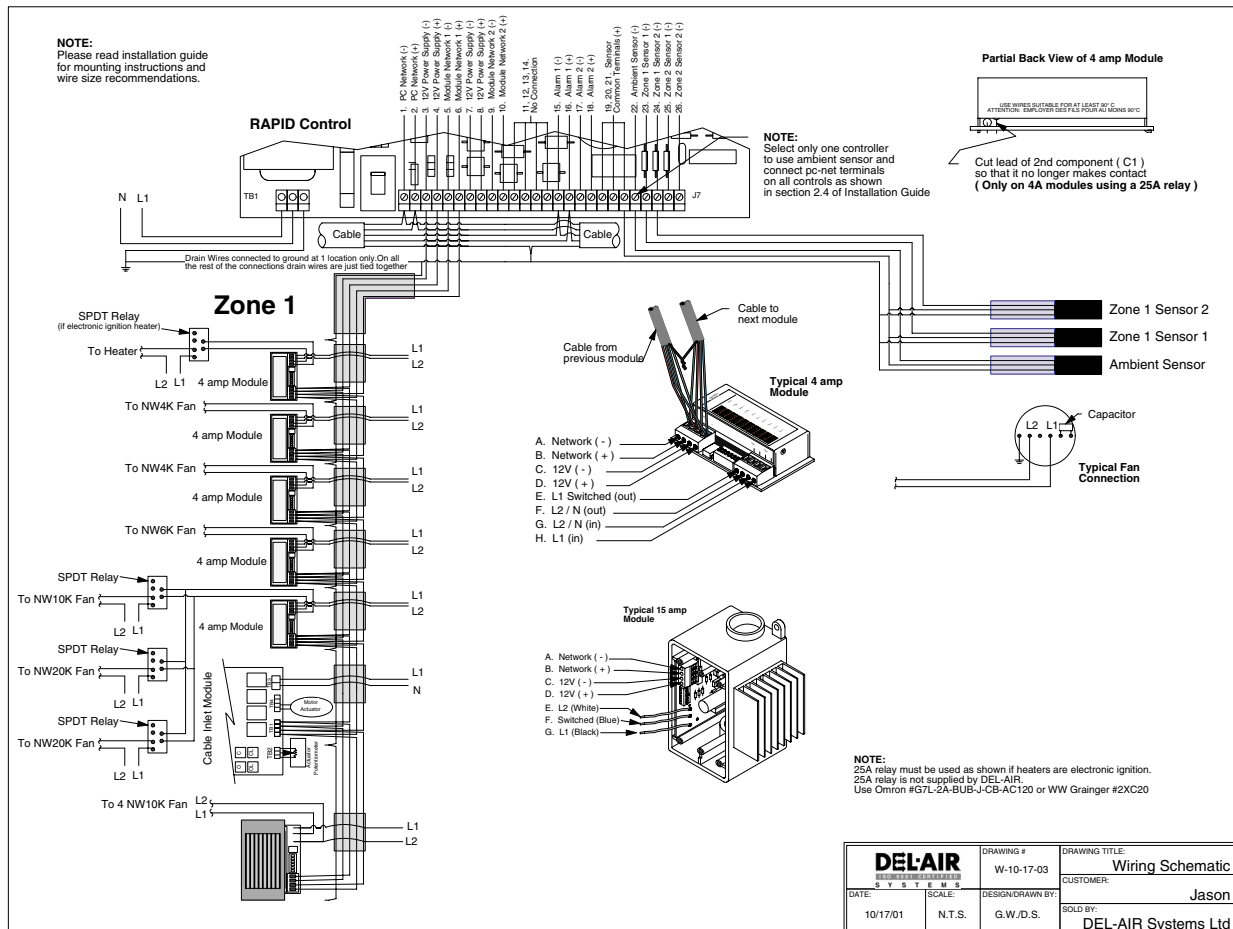


Figure 3

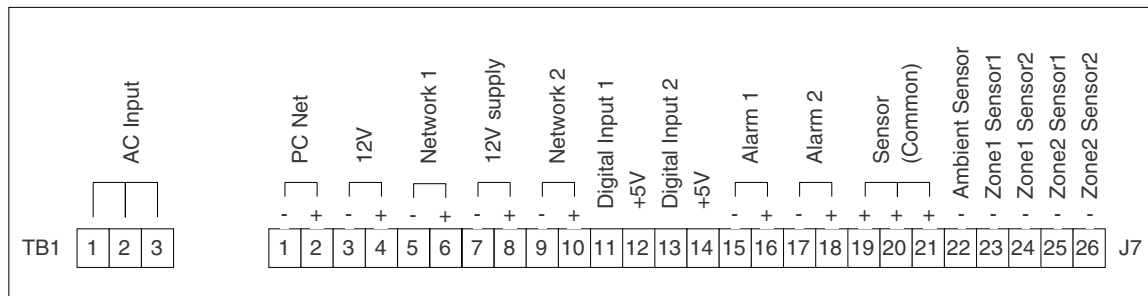
NOTE:

All wire used with the RAPID Control must be rated minimum 300V and be wired in accordance with CEC/NEC class 1 methods.

IMPORTANT!

When any wiring is being done at the RAPID Control all power to the control must be off to insure the protection of the installer and the protection of the electronics. All power includes the power that runs the control (TB1), and any power that may be run to the alarm contacts (terminals 15, 16, 17 and 18).

Figure 4 shows all the terminals on the RAPID Control that are used for installation. TB1 is the power input for the control, all other connections to the control, described in Sections 2.2 PC Network to 2.5 The Module Network, are connected to the terminals on J7.

**Figure 4**

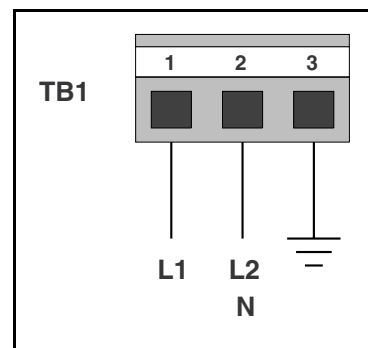
For all wire types, lengths and other information concerning the RAPID Control please refer to Appendix A.



2.1 Power Input

Power is connected to the RAPID Control using all the terminals of Terminal Block 1 (TB1). The control's power input is selectable to either 115 or 230 VAC. It will operate at 50/60 Hz. Connect power as shown in Figure 5.

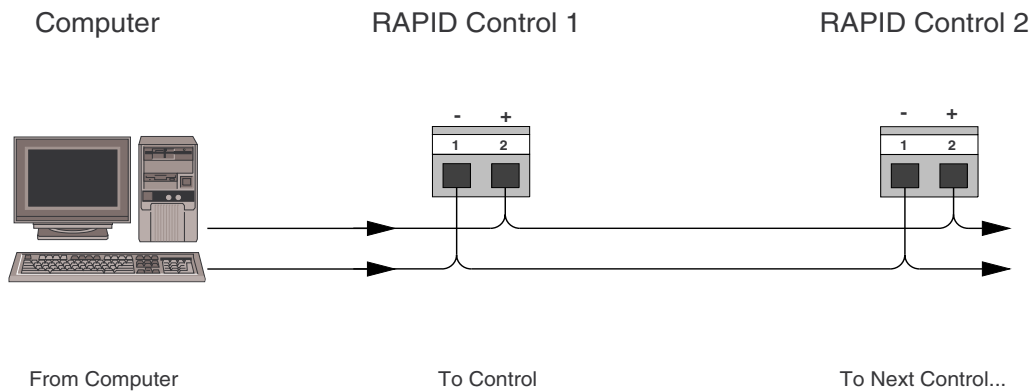
- Before powering, make sure the power selector switch is in the appropriate position. See Figure 2 - RAPID Control Circuit Board.
- Figure 4 shows the position of TB1.

**Figure 5**

2.2 PC Network

The PC Network can be used with or without a computer connected to the network. Connecting the PC-Net, with or without a computer, allows a single ambient sensor to be used instead of every control in the facility needing an ambient sensor. The control with the ambient sensor will broadcast the ambient temperature over the PC-Net to the other controls. The second use for the PC-Net is connecting the controls to a PC running the RAPIDPC software package. Using RAPIDPC you can view in real time how the control is operating, make changes to settings, and log temperatures and events. As an alternative to having a computer in the barn, RAPIDPC REMOTE can be installed so that you dial into the network with a remote computer.

The RAPID Control uses an RS-485 twisted-pair network to connect all controls and an optional computer together. The connection is made using a daisy-chain configuration. The Daisy Chain is shown below:

**Figure 6****IMPORTANT:**

The network connection is polarity sensitive. Ensure that all wiring is consistent between all devices.

HINT:

The PC Network wires and the Alarm System wires can be run in a single 2 pair twisted pair cable since both these pair usually run to all the controls and then back to a central office where the computer and alarm are located.

What Is A Daisy-Chain Configuration?

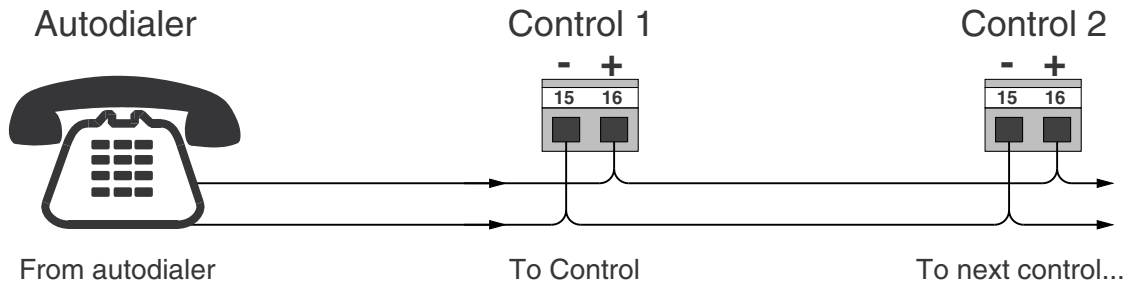
Like a chain, the network is linked so that there are only two ends. This is a requirement for the communications network. It is not permissible to split the connection at one control and go to multiple controls, as this would create more than two ends in the chain. As well, the chain is not looped together; it must be installed such that there are two ends.

IMPORTANT:

Network wires must be in separate conduit from high voltage lines and must be at least 16" from parallel running high voltage lines. If Network wires cross any high voltage wires they must cross at 90°.

**2.3 Alarm System**

The RAPID Control has two normally open contacts (terminals 15, 16 and terminals 17, 18) which may be used to control a central auto-dialer or local siren. When the RAPID Control is properly powered, the contacts on the relay are open (with no alarms). These contacts will remain open until an alarm occurs. Alarms include: High Temp, Low Temp, Sensor Failure and Power Failure.

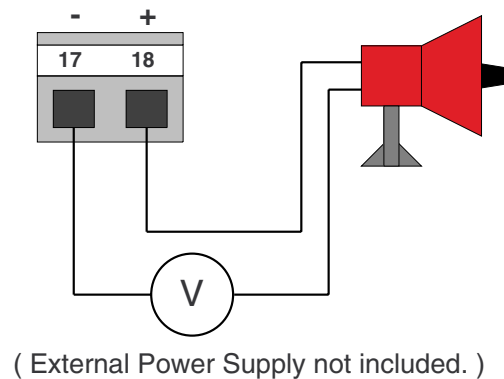
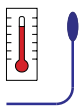
Connecting to an auto-dialer:**Figure 7**

See Figure 4 for the terminal positions.

- The auto-dialer should not be connected until all controls have been connected.
- Refer to the installation guide that was included with your autodialer for more information.

Connecting to a local siren:

Either pair of alarm terminals may be used to power any device that does not exceed 1.0 Amp @120VAC or 2.0 Amps @25VDC. The device must be powered by an external supply.

**Figure 8****2.4 Sensors**

Each standalone control must have **one** ambient sensor and at least **one** room sensor per zone. The ambient sensor must be installed on each control unless the PC-Net is connected. If the PC-Net is connected, only one control needs to have an ambient sensor installed. The control that has the ambient sensor installed and enabled will transmit the ambient temperature to the rest of the controls over the PC-Net.

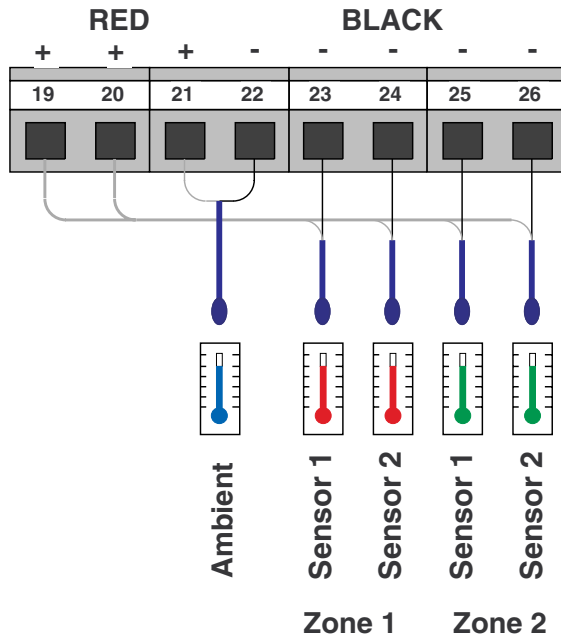
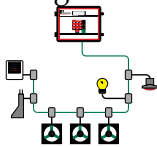


Figure 9

There are three common terminals on the sensor block (19 to 21). These are the positive terminals of the sensor, indicated by a red (or white) wire. The positive wires may be tied together and installed in any of the three positive terminals. The negative wire on the sensors (black wire) connects to the terminal labeled for that particular location.

e.g. The creep sensor for Zone 1 has its black wire connect to terminal 24.

The drain wire, which is connected to the cable shield, should be connected to the ground wire at the RAPID Control.



2.5 The Module Network

The RAPID Control uses distributed "SMART" modules to control both Variable Speed and On/Off outputs. The RAPID Control communicates with the modules using a network similar to the PC-Net.

In addition to the network, the RAPID Control also supplies the DC voltage for

Sensor Options

Sensor 1 must always read the Zone (room) temperature.

Sensor 2 can be configured as the Creep Sensor or a second Zone Sensor. When used as a second Zone Sensor, its reading is averaged with Sensor 1 to give the average Zone (room) temperature. See User Manual for more information.

NOTE:

Sensor wires can be run in the same conduit as the module network wires.

IMPORTANT:

Sensor wires must be in separate conduit than high voltage lines and must be at least 16" from parallel running high voltage lines. When crossing high voltage lines, sensor wires must cross at 90°. Temperature readings may be affected by electrical noise if this precaution is not taken

the electronic part of the module. Therefore, the Daisy Chain will be made using 2 pairs of wires.

There are two module network outputs on the control. Terminals 5 and 6 are used for **Module Network 1** and terminals 9 and 10 are used for **Module**

Network 2. Related to the network is the 12V power, terminals 3 and 4 are used with Module Network 1 and terminals 7 and 8 are used with Module Network 2 to supply the 12V power. Neither network is zone specific. The RAPID Control sends all commands to all modules over both networks. The Zone selection is made on the module itself (See Section 9 Module Addressing).

Networks 1 and 2 must not be tied together. A separate Daisy Chain must be run for each network if both are used.

- See Figure 4 for the terminal locations.

Figure 10 shows how to connect module network 1 and its 12V supply at the RAPID Control.

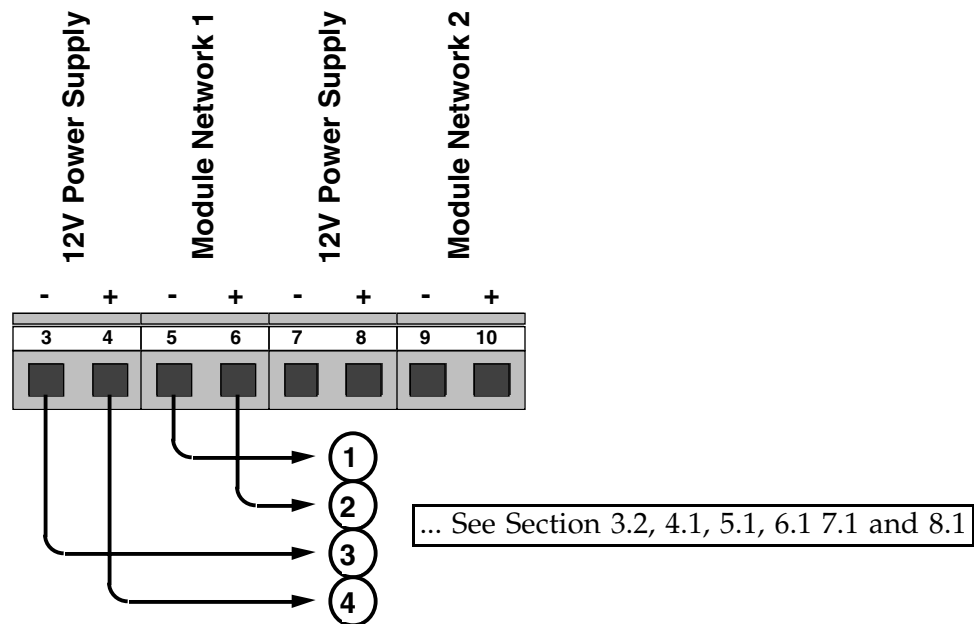
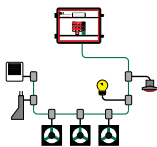


Figure 10



2.6 Terminating the shielding

All the wire used for the low voltage wiring, (12V, network, sensors, digital inputs, PCNET and alarm) should be using shielded cable (see Appendix A). This section describes how to terminate the shielding properly.

The purpose of the shielding around the wires inside the cable is to protect the wires from induced voltage spikes. These spikes can range from small noise

caused by AC wires that may be around the cable to extreme spikes caused by lightning.

Shielded cable will have a bare wire included with the other wires in the cable. This wire is called the drain wire. The drain wire is connected to the shielding inside the cable.

To protect the wires from spikes the drain wire must be tied to ground. The

drain wire should be connected directly to the ground wire, not using any of the RAPID Control terminals to make the connection. This should be done at one point only, never have the drain wire connected to ground at more than one point per cable. For sensors that means connecting the drain wire to ground at the control. For the module network, 12V and digital inputs that means connecting the drain wire to ground at the control. For the entire length of cable to be protected, the drain wire in the cable coming into the module must be connected to the drain wire in the cable going out of the module.

Connecting the drain wire for the PCNET and alarm is somewhat different. Since the drain wire is to be connected to ground at one spot only, DO NOT connect the drain to ground at each control. Pick ONE location to connect the drain to ground, this could be at one control OR where the cable goes to the alarm system OR where the cable comes to the computer system. Ideally the ground that any electronics are connected to should be an isolated ground, a ground that is used specifically for the electronic equipment. This is not necessary but can be decided by the electrician doing the wiring as well as the electrical code.

3 RAPID Multi Device Module

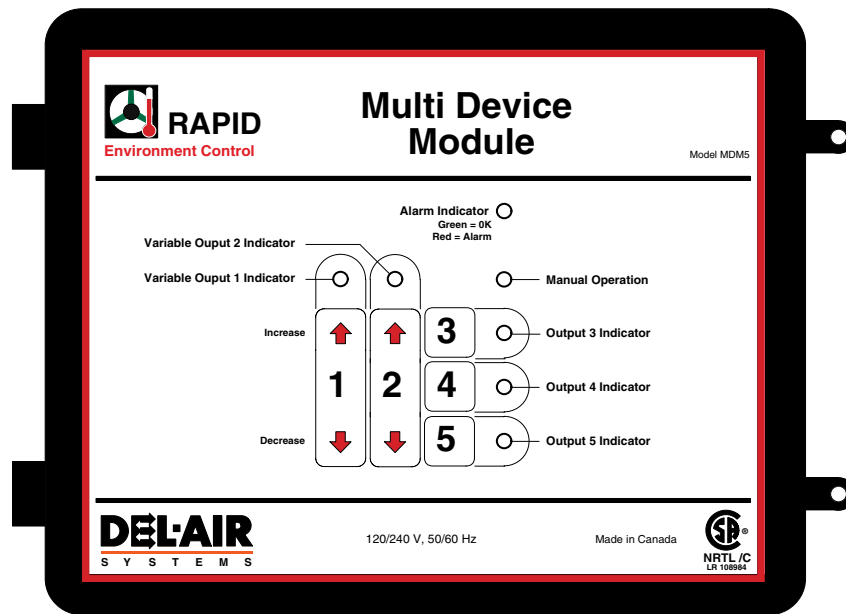
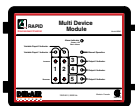


Figure 11

The Multi Device Module is the primary means for controlling the devices that make up the ventilation system. This module has five separate outputs for controlling devices. Two of the channels are capable of supplying variable voltage out, the remaining three channels are relay operated. Each channel is capable of controlling more than one device as long as the maximum load is not exceeded. The two variable channels are capable of supplying 5 amps each at either 120 or 240VAC. The three relay

channels are capable of supplying 10 amps each at either 120 or 240VAC.

The Multi Device Module is most useful when all of the power cables are connected to each device from a single point. When the power cables are connected to multiple devices that are not controlled identically then individual 4 Amp modules are a better choice for the control of the devices since these can be mounted right at the device.



3.1 The Multi Device Modules Features

The front panel of the module is set up to show when each of the five devices are being powered, when the module is in alarm and whether the module is being controlled automatically or manually (see Figure 11).

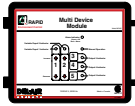
The top right indicator on the front panel is the alarm indicator. When it is green the module is running properly, when it is

red the module is not communicating with the RAPID Control.

Under the alarm indicator is the Manual Mode indicator. When the indicator is off, the module is being controlled by the RAPID control. When the indicator is on then the module is in manual mode and can be controlled by the buttons on the front panel.

Above buttons 1 and 2 and to the right of buttons 3, 4 and 5 are channel output indicators. These indicators show whether the module is supplying power to the devices on that channel or not. Since channels 1 and 2 are variable, the indicator brightens and dims according to the amount of power being supplied by the module for that channel. The indicators

for channels 3, 4 and 5 are either on or off depending on the state of that channel. The Multi device module board inside has two more indicators (see Figure 12). On the top left area of the board is DS2. DS2 will flash when it sees communication on the network wires. DS5 is located below DS2. DS5 is on when the Multi Device Module is being properly powered.



3.2 The Network & 12V Power supply

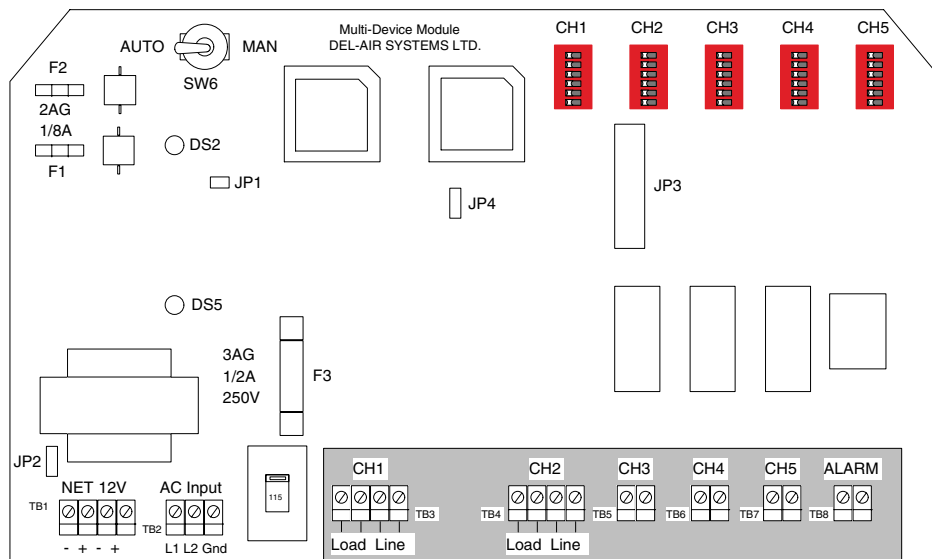


Figure 12

IMPORTANT!

When any wiring is being done at the Multi Device Module all power must be off to insure the protection of the installer and the protection of the electronics. All power includes the power that runs the module (TB2), the power that is run to each of the channels (including alarm) and the power to the RAPID Control.

On the bottom left of the Multi Device Module board is the network and 12V supply terminals (TB1). The network and 12V wires from the RAPID Control are connected to these terminals. Section 2.5 The Module Network shows the terminal locations of the network and power supply on the RAPID Control. The connection at the module is shown in Figure 13:

IMPORTANT:

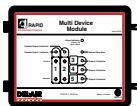
Network and 12V terminals are reversed on the modules compared to the placement on the RAPID control.

From Control
See Section 2.5 The
Module Network

NOTE:

Network wires must be in conduit separate from high voltage lines and must be at least 16" from parallel running high voltage lines. If network wires cross high voltage wires they must cross at 90°.

The Multi module is the only module that is self-powered and is able to run without the 12V wires being attached.



3.3 The AC Power Supply

Unlike the other RAPID modules, the electronics on the Multi Device Module is powered by 120/240VAC instead of the 12V supply from the RAPID Control. There is a separate terminal block (TB2) for AC power to be connected that runs the electronics on the board. The power can be split off from either of the variable channels or be supplied from a separate breaker. There must be a ground wire run to the module. The AC input is to supply only the power needed to run the electronics on the board and it not used for any of the output channels.

The AC power terminal block (TB2) is located to the right of the Network/12V terminal block. The connections for the AC are set up identically to the RAPID

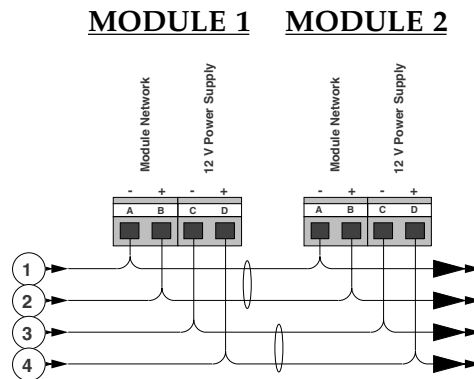


Figure 13

Since it is self powered it is not necessary to run the 12V wires to the module although generally it is easier to run the wires to it and then carry on to the next modules that do need the 12V wires.

In the case of surges on the communication lines the module is protected by a surge suppression circuit. In the event of an extreme surge the communication lines are also protected with fuses.

Control's AC input. Figure 14 shows the connections.

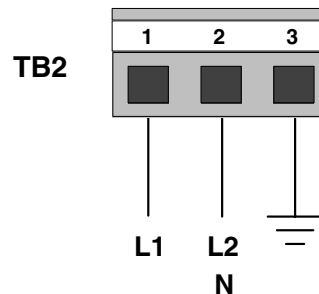
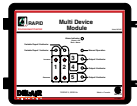


Figure 14

Before applying power to the Multi module ensure that the voltage selector switch is in the proper position for the power that is connected to the AC input.



3.4 The Variable Output Channels

The variable channels are labeled as CH1 and CH2. These channels can be configured to run any of the devices listed in Table 2 of Section 9 Module Addressing.

The Power input may be 120/208/240 VAC @ 50/60 Hz. Figure 15 shows the internal switching of the module. Each channel is made up of a four terminal block. The power enters on terminal 4. The “switched” line to the motor is terminal 1. The direct (common) line is connected to terminals 2 and 3. The direct line must be connected to the module so that it can make the necessary measurement for speed control and On/Off commands.

A module is wired to a load or device as shown in Figure 15.

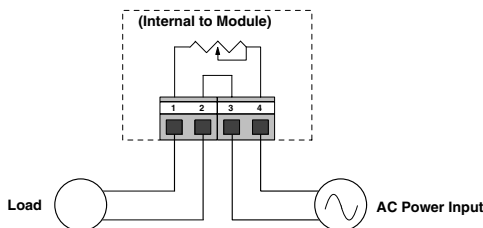


Figure 15

NOTE:

Each module must have the AC connected to terminals 3 and 4. For 120V, the Line is connected to terminal 4 and the Neutral to terminal 3. For 240V, either leg can be connected to terminals 4 and 3, as long as both legs are connected.

NOTE:

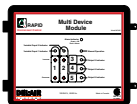
Stranded wire is recommended since it is much more flexible than solid wire. Solid wire may damage the terminal block.

IMPORTANT:

Do **NOT** use the Multi modules variable channels to switch relays. The leakage current of the module may keep the coil energized even when the module turns off.

NOTE:

You can not measure the voltage of the output of the variable channels **if there is no load attached**. When there is no load, the output will show whatever the input voltage is, so readings will not accurately show the state of the module.



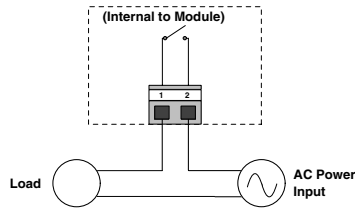
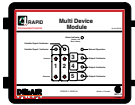
3.5 The Relay Output Channels

The relay channels are labeled as CH3, CH4 and CH5. These channels can be configured to run any of the devices listed in Table 2 of Section 9 Module Addressing.

The Power input may be 120/208/240 VAC @ 50/60 Hz. Figure 16 shows the internal switching of the module. Each channel is made up of a two screw

terminal block. The power enters on terminal 2. The “switched” line is terminal 1. This channel is simply a relay that switches power just like a light switch. The Line 2/Neutral wire does not get connected to the module.

A module is wired to a load or device as shown in Figure 16.

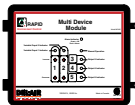
**Figure 16**

3.6 The Alarm Contact

The Multi Device Module is equipped with one normally open alarm contact. This contact closes when the module is in a state of alarm. There are two conditions that cause an alarm, the first is loss of power and the second is loss of communication for a period of five minutes. The alarm indicator on the front panel shows the alarm condition. When the indicator is green there is no alarm. When the indicator is red then the module is in alarm and the contact will be closed.

The alarm contact is meant to be used in either of two of the following ways, not both.

- 1) Connect the alarm contact to the RAPID control's alarm. Doing this will activate the alarm system that is connected to the RAPID control as soon as the module recognizes an alarm.
- 2) Wire the alarm contact to turn on a piece of equipment when the module goes into alarm. It may be set up so that the minimum ventilation will automatically turn on if the module fails.



3.7 Automatic and Manual Operation

The Multi Device Module has two modes of operation; Manual and Automatic. The mode is chosen using Switch 6. Switch 6 is the toggle switch on the top left of the Multi Device Module board (see Figure 12). This switch can be changed at any time, powered or not.

When the switch is flipped to the left, the control is in automatic mode. In auto mode, the module responds to commands from the RAPID control. The buttons on the front panel will not operate then the module is in auto mode and is being controlled by the RAPID control.

When the switch is flipped to the right, the control is in manual mode. When the control is in manual, the manual mode indicator on the front panel is lit. In

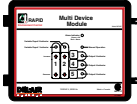
manual mode the module will not respond to commands from the RAPID control, instead you can increase and decrease the variable channels and turn on and off the relay channels using the front panel.

When the switch is flipped from Auto to Manual, the module continues to run the equipment as it was before the switch was flipped.

To vary the 2 variable channels you press either the up arrow to increase or the down arrow to decrease the output. Pressing the arrow and releasing increases or decreases by a single step. Pressing and holding the arrow button results in the speed continuing to increase or decrease. It takes about four seconds to go from 0% to 100% when holding down the up arrow button. As

you increase and decrease the variable channels, the indicator for that channel will brighten and dim accordingly. To turn the 3 relay channels off and on press the number button for that

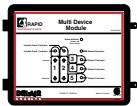
channel. When the channel is on the indicator for the channel will be lit, when the channel is off the indicator will go off as well.



3.8 Configuring the Multi Device Module

Each of the channels is configured using the blocks of switches in the top right side of the circuit board. Each of the switch blocks is labeled for which channel it configures. Channel 1 is on the

far left and channel 5 is on the far right. These switches can be changed at any time, when the board is powered or not. See Section 9 Module Addressing for the addressing codes.



3.9 Troubleshooting the Multi Device Module

When the Multi Device Module is powered, DS5 on the circuit board should light up. If it does not light up check the breaker, the voltage selector switch and the main fuse (F3). If all of these are OK then measure the voltage at the AC input to make sure it is OK. If the network wires are connected and the RAPID Control running, DS2 on the circuit board should be flashing. Generally the light will be off for two seconds and then will flash very quickly for 3 seconds. If the light is doing the reverse then the network wires are most

likely reversed. If the indicator does not light up at all then check fuses F1 and F2.

The module can also be tested without having to be connected to the RAPID Control or with the control off. With power being supplied to the module, switch SW6 to the right (Manual Mode) and use the front panel to turn on and off the channels.

If the display does not respond, make sure the ribbon cable from the front panel is plugged into JP3 properly.

4 RAPID 4 Amp Module

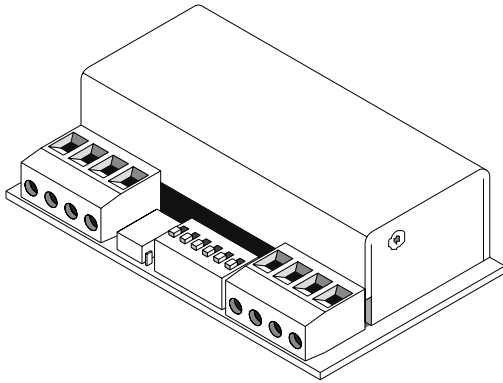


Figure 17

The 4 Amp Module consists of three main parts:

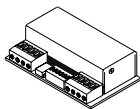
1. RAPID Module Network & Power Supply Input Terminals.
2. Module Addressing Switches. (DIP Switches)
3. AC Power Input and Load Control Output Terminals.

Having modules designed this way allows:

- Modules to be located near the load that it is operating. AC power does not have to be brought back to the control for each load that is controlled.
- Control of multiple devices on any stage.
- Greatly reduced electrical management of the facility. The module itself reads the phase information from the AC input to provide variable speed control for the load. The module's power input does not have to be on the same phase as the control itself. Two or more modules addressed to the same stage do not have to be on the same phase of power.

IMPORTANT!

When any wiring is being done at the 4Amp Module all power must be off to insure the protection of the installer and the protection of the electronics. All power would include the power that the module is switching (L1 and L2/Neutral) and the power to the RAPID Control.



4.1 The Network & 12V Power supply

The network and 12V terminal block is the terminal block on the left side of the module as shown in Figure 17. Section 2.5 The Module Network shows the terminal locations of the network and power supply on the RAPID Control. The connection at the module is shown in Figure 18:

IMPORTANT:

Network and 12V terminals are reversed on the modules compared to the placement on the RAPID control.

From Control
See Section 2.5 The
Module Network

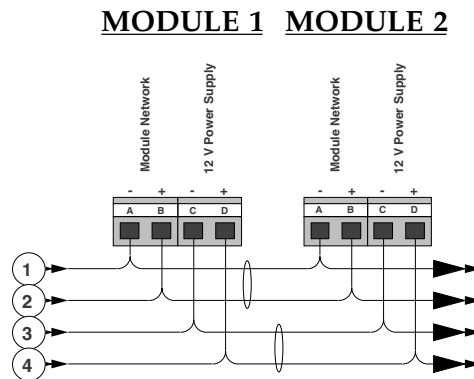
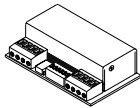


Figure 18



4.2 AC Power and Load Output

The RAPID 4 Amp Module may be used as either a Variable Speed or On/Off Module.

This selection is made using the DIP switch settings described in Section 9 Module Addressing.

The Power input may be 120/208/240 VAC @ 50/60 Hz. Figure 19 shows the internal switching of the module. The power enters on terminal H. The "switched" line is terminal E. The direct (common) line is connected to terminals F and G. The direct line must be connected to the module so that it can make the necessary measurement for speed control and On/Off commands.

A module is wired to a load or device as shown in Figure 19.

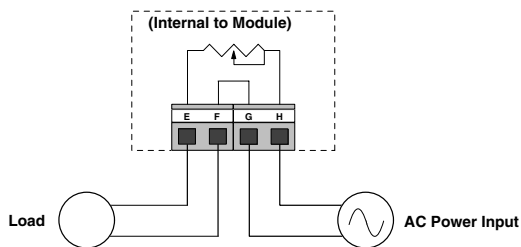


Figure 19

NOTE:

Each module must have the AC connected to terminals G and H. For 120V, the Line is connected to terminal H and the Neutral to terminal G. For 240V, either leg can be connected to terminals G and H, as long as both legs are connected.

IMPORTANT:

When using the 4ADM to operate a relay, you **must** cut the leg of the capacitor on the 4ADM as shown in Figure 20. Use relays with **120VAC** coils such as the Omron G4L series relay.

Partial Back View of 4 amp Module

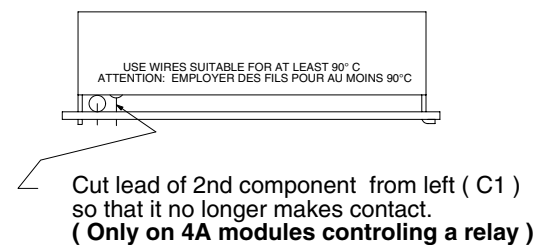


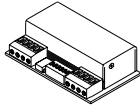
Figure 20

NOTE:

Network wires must be in separate conduit than high voltage lines and must be at least 16" from parallel running high voltage lines. If network wires cross high voltage wires they must cross at 90°.

NOTE:

You can not measure the voltage of the output of the 4 Amp Module **if there is no load attached**. When there is no load, the output will show whatever the input voltage is, so readings will not accurately show the state of the module.



4.3 4 Amp Module Enclosure

The RAPID 4 Amp Module does not come with its own enclosure. It has been designed to fit in a standard single gang F Series Scepter brand box or equivalent.

The enclosure chosen for the 4 Amp Module must be a CSA and UL approved **non-metallic** box with sizing of at least 4 1/4" X 3 1/2" X 2" with NEMA 4 rating.

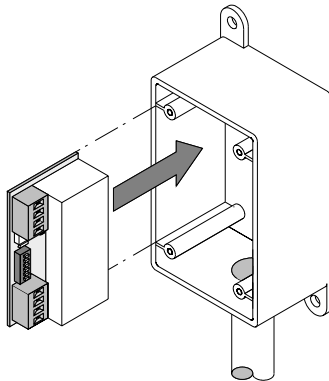


Figure 21

The module slides in between the lid mounting screws on the side of the enclosure.

IMPORTANT:

Ensure that the enclosure is properly sealed once the module is coded and wired.

Improper sealing of the enclosure may lead to an electrical failure at the module as a result of moisture damage.

IMPORTANT:

The 4 Amp module enclosure should be mounted so the module sits vertically, as in Figure 21, and not horizontally. Do not mount the module on the ceiling. When mounted vertically, the module will be less likely to be affected by moisture and contaminants present in the barn.

5 RAPID 15 Amp Module

Electrically, the 15 Amp module (shown in Figure 22) is identical to the 4 Amp module described in Section 4 RAPID 4 Amp Module. Larger components and an external heat sink allow this module to power loads at up to 15 Amps either variably or On/Off.

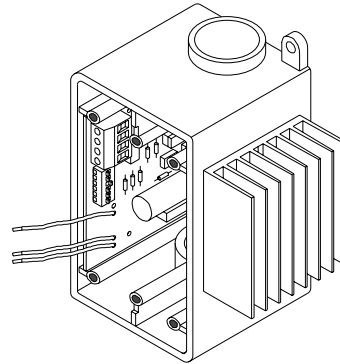
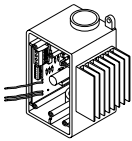


Figure 22

IMPORTANT!

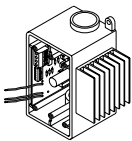
When any wiring is being done at the 15 Amp Module all power must be off to insure the protection of the installer and the protection of the electronics. All power would include the power that the module is switching (L1 and L2/Neutral) and the power to the RAPID Control.



5.1 The Network & 12V Power supply

The connections at the 15 Amp Module for network and 12V power supply wires are identical to the 4 Amp Module.

Refer back to Section 4.1 The Network & 12V Power supply for details.



5.2 AC Power and Load Output

The RAPID 15 Amp Module may be used as either a Variable Speed or On/Off Module.

This selection is made using the DIP switch settings described in Section 9 Module Addressing.

The Power input may be 120/208/240 VAC @ 50/60 Hz.

Figure 23 shows the internal switching of the module.

The line power is connected to the BLACK wire. The BLUE wire is the “switched” line. Line 2 or Neutral is connected to the WHITE wire.

A module is wired to a load or device as follows:

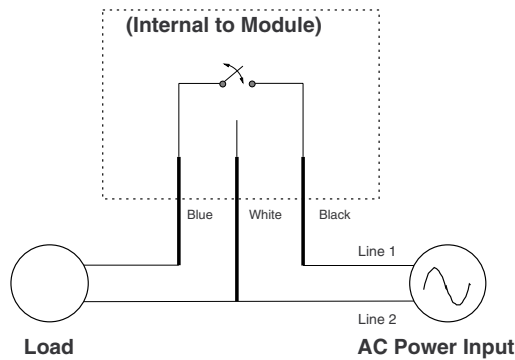


Figure 23

NOTE:

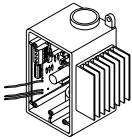
Each module must have the AC connected to the Black **and** White wires. For 120V, the Line is connected to Black and the Neutral to White. For 240V, either leg can be connected to Black and White, as long as both legs are connected.

NOTE:

Network wires must be in separate conduit than high voltage lines and must be at least 16" from parallel running high voltage lines. If network wires cross high voltage wires they must cross at 90°.

NOTE:

You can **not** measure the voltage of the output of the 15 Amp Module **if there is no load attached**. When there is no load, the output will show whatever the input voltage is, so readings will not accurately show the state of the module.



5.3 15 Amp Module Enclosure

The RAPID 15 Amp Module comes with its own enclosure. It is shipped in a modified Scepter brand FDC15 or FDC20. The module can be replaced without removing the entire enclosure but the module will not fit into a standard FDC box.

The module slides in between the lid mounting screws on the side of the enclosure.

IMPORTANT:

Ensure that the enclosure is properly sealed once the module is coded and installed.

Improper sealing of the enclosure may lead to an electrical failure to the module as a result of moisture damage.

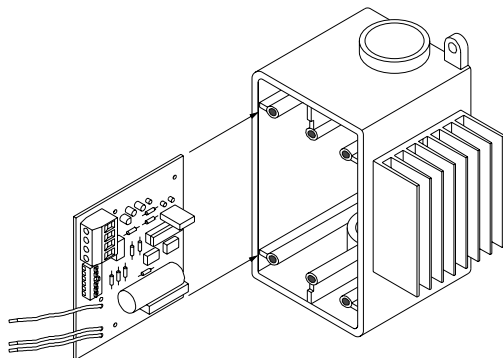


Figure 24

IMPORTANT:

Install the enclosure as shown in Figure 24. If it is installed in another orientation the heat sink may not have enough airflow and could overheat

6 RAPID AC Curtain Control Module

The RAPID Control uses a special module for controlling the curtains used in the Natural Ventilation system. The Curtain Module is enclosed in a box that is similar to the RAPID Control itself. When the cover is opened, the board sits in the top left corner of the enclosure. Figure 25 shows the layout of the AC Curtain circuit board.

- TB2 is not used when the module is set for curtain applications.

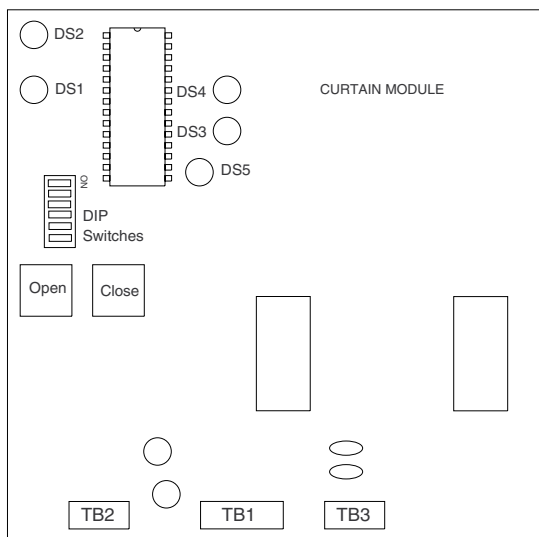


Figure 25

Since this is still a module, it has the basic configuration and advantages of the 4 Amp Module described in Section 4 RAPID 4 Amp Module. In addition to that, having curtain modules will allow control of multiple curtains on any one stage if a facility is large enough to need multiple actuators for a stage of curtain.

IMPORTANT!

When any wiring is being done at the curtain module all power must be off to insure the protection of the installer and the protection of the electronics. All power would include the power that the module is switching (L1 and L2/Neutral) and the power to the RAPID Control.

6.1 The Network & 12V Power Supply

The network and 12V supply are connected to TB1 of the Curtain Module. The connections are in the same order as the 4 Amp module. Refer back to Section 4.1 The Network & 12V Power supply for details.

Section 2.5 The Module Network shows the terminal locations of the network and power supply on the RAPID Control.

Note:

The connections on the AC Curtain Module for network and 12V power supply wires are identical to the 4 Amp Module.

6.2 AC Power and Load Output

The RAPID AC Curtain Module is designed to switch the AC input to operate a motor (actuator) in forward or reverse motion. The module can be set to operate Curtain 1, 2, 3 or 4. This selection is made using the DIP switch settings described in Section 9 Module Addressing.

Figure 26 shows the internal switching part of the module. Using TB3, line 1 enters the module on terminal 1 and the neutral is wired directly to the motor. The “switched” lines are terminals 2 and 3. Terminal 2 is activated for the

OPEN command and terminal 3 is activated for the CLOSE command.

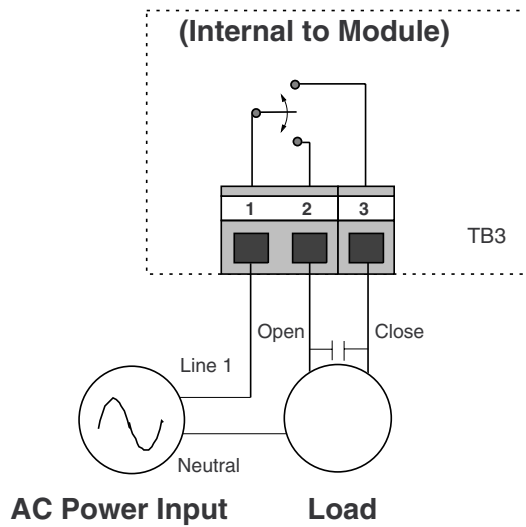


Figure 26

IMPORTANT:

Network wires must be in separate conduit than high voltage lines and must be at least 16" from parallel running high voltage lines. If network wires cross high voltage wires they must cross at 90°.

6.3 Installation Check

When the module has the 12VDC power supplied as well as the AC power, the control can be manually operated by pressing the buttons labeled "O" (open), and "C" (close). When "O" is pressed DS2 should light and the curtain open. When "C" is pressed DS1 should light and the curtain should close. If the actuator runs backwards (closes when "O" is pressed) then wires on terminals 2 and 3 have to be reversed to correct the problem.

NOTE:

Pressing the "O" or "C" buttons will override any signals sent by the control at the time.

7 RAPID DC Cable Inlet Module

The RAPID Control uses a special module for controlling the inlets used in mechanical ventilation systems. The DC Cable Control Inlet Module is enclosed in a box that is similar to the RAPID Control itself.

When the cover is opened, the board sits in the top left corner of the enclosure.

Figure 27 shows the layout of the DC Cable Module.

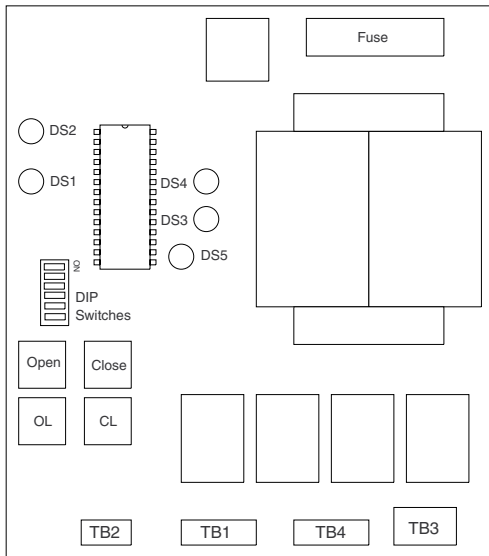


Figure 27

Since this is still a module, it has the basic configuration and advantages of the 4 Amp Module described in Section 4 RAPID 4 Amp Module. In addition to those advantages, having modules allow for control of multiple actuators on any zone if a facility is large enough to need more than one actuator per zone.

IMPORTANT!

When any wiring is being done at the cable module all power must be off to insure the protection of the installer and the protection of the electronics. All power would include the power that runs the module (TB3) and the power to the RAPID Control.

7.1 The Network & 12V Power Supply

The network and 12V supply are connected to the module using TB1. Section 2.5 The Module Network shows the locations of TB1 and the remaining terminal blocks.

The connections at the Cable Module (TB1) for network and 12V power supply wires are identical to the 4 Amp Module.

Refer back to Section 4.1 The Network & 12V Power supply for details

7.2 AC Power and Actuator Connections

The RAPID DC Cable Module is designed to receive the AC input, it converts this to a DC output that is able to operate a motor (actuator) in forward or reverse motion. The DIP switch settings are described in Section 9 Module Addressing for the Inlet Control Module.

Figure 28 shows the connections for the AC power and the Actuator.

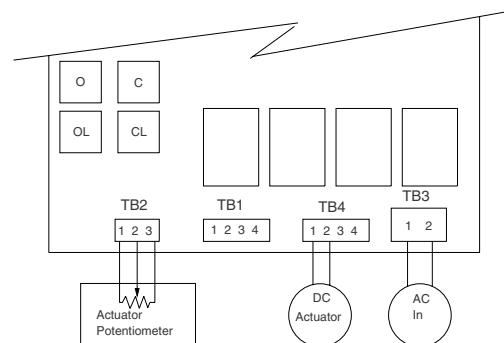


Figure 28

Connection Description:

- Line 1 and Neutral enter the module on terminals 1 and 2 of terminal block TB3.
- The DC output to the actuator is from terminals 1 and 2 of terminal block TB4.
- The module uses a potentiometer connected to the actuator for position sensing. Terminal 1 of TB2 supplies the 5VDC and terminal 3 provides the ground for the pot. Terminal 2 is the wiper of the pot; it is this terminal that senses the position of the actuator.

7.3 Installation Setup and Test

When all connections to the module are complete, the 12VDC power and AC power may be applied. When it has been powered, pressing the button labeled "O" (open) should light DS2 and open the inlets; pressing the "C" button should light DS1 and close the inlets. If the inlets respond backwards the wires on terminals 1 and 2 of TB4 can be reversed.

When the module has been tested to run properly, it then needs to be set up. The module needs to know the Open Limit and Closed Limit. To set the Open Limit press the "O" button until the inlets are fully opened, when they are open press

the "OL" (Open Limit) button. When the "OL" button is pressed DS4 lights to indicate that the setting was saved. The Closed Limit is set the same way, by pressing the "C" button until the inlets are closed and then pressing the "CL" (Closed Limit) button. When the "CL" button is pressed DS3 lights to indicate that the setting was saved.

- DS5 is an indicator that the network wires are operational. The indicator is off when no signal is present and flashes when signals are present.

NOTE:

The control should be in Monitor program while doing any manual movement of the actuator from the module itself.

IMPORTANT:

When pressing the OPEN and CLOSE buttons on the module, the only limit of movement is any limit on the actuator itself. **Remember** that while pressing these buttons it is up to the user to judge how long to continue movement, damage to the inlet system may occur if movement continues after the inlets have reached their limits.

8 Output Device Module

Some equipment is controlled by receiving a signal from a controller. 0-10VDC and 4-20mA are two common signals which equipment responds to. The Output Device Module is designed to supply this type of signal.

The Output Device Module is able to be set to any of the addresses that the 4 Amp device module can be set to (see Table 2). Instead of supplying an AC voltage output which directly drives loads the Output Device Module supplies a DC voltage proportionally to the range that it is set to supply.

8.1 The Network & 12V Power supply

The connections at the Output Device Module for network and 12V power supply wires are identical to the 4 Amp Module.

Refer back to Section 4.1 The Network & 12V Power supply for details.

8.2 The Load Output

The module is able to supply only a small amount of current since it is not meant to power the load. There are three different voltage ranges that the module can supply; 0-10V, 2-10V and 3-7V. When a 4-20mA signal is required, use the 2-10V setting and a 500 Ω resistor. To select the voltage range set the S1, DIP switches as show in Table 1

Table 1

Output	Switch 1	Switch 2
0-10V	OFF	OFF
2-10V	OFF	ON
3-7V	ON	OFF

9 Module Addressing

Each module must be addressed to the device that it is controlling. This is necessary because the RAPID Control sends all commands to all of the modules over the twisted pair of wires.

The codes that the Multi Device Module, 4 Amp Module, 15 Amp Module and Output Module can be set to are shown in Table 2.

Table 2

Controlled Device	Switch 1	Switch 2	Switch 3	Switch 4	Switch 5
Stage 1 Zone Heater	OFF	OFF	OFF	OFF	OFF
Stage 2 Zone Heater	ON	ON	ON	ON	ON
Creep Heater	OFF	OFF	ON	OFF	OFF
Stage 0	OFF	ON	ON	ON	ON
Stage 1 Fan	ON	OFF	OFF	OFF	OFF
Stage 2 Fan	OFF	ON	OFF	OFF	OFF
Stage 3 Fan	ON	ON	OFF	OFF	OFF
Timer 1	ON	OFF	ON	OFF	OFF
Timer 2	OFF	ON	ON	OFF	OFF
Timer 3	ON	ON	ON	OFF	OFF
Spray/Drip Cool	OFF	ON	OFF	OFF	ON
Stage 1 Tunnel Fan	ON	OFF	OFF	OFF	ON
Stage 2 Tunnel Fan	ON	ON	OFF	OFF	ON
Stir Fan	OFF	OFF	OFF	OFF	ON

The codes that the Cable and Curtain Modules can be set to are shown in Table 3.

Table 3

Cable Control	OFF	OFF	OFF	OFF	OFF
Curtain 1	OFF	OFF	OFF	ON	OFF
Curtain 2	OFF	OFF	ON	ON	OFF
Curtain 3	OFF	OFF	OFF	OFF	ON
Curtain 4	OFF	OFF	ON	OFF	ON

Every module must be told what zone it is in. Table 4 shows how to address the zone switch.

Table 4

Zone	Switch 6
Zone 1	OFF
Zone 2	ON

It is possible to set more than one module on the same code. If, for example, three Stage 1 fans are required in a zone, set all three modules to the same code. The RAPID Control will communicate to and control all three modules simultaneously.

The codes can be changed at any time, powered or not.

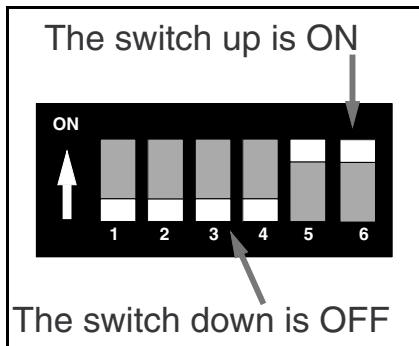


Figure 29

10 Testing The Operation Of The Control

After all devices have been wired and are ready to be run, they can be tested from the RAPID without having to program any of the setup into it.

First the control has to be put in MONITOR mode so it does not try to control the devices. This is accomplished by pressing the VENT button (#4), then selecting which zone is to be tested using the up/down arrows and pressing OK.

After selecting the zone, use the up/down arrows to select MONITOR and press OK. When it says PROGRAM RUNNING press OK to finish.

To actually test the devices, press the TEST button (#7), select the zone and then the device to test. See the User Manual for more information on how to run the tests on the modules.

Appendix A

Wiring Installation Requirements

Control	
Power Input Wire type Connections	16 AWG stranded (minimum) 300V minimum rating TB1 terminals 1,2 and 3 (See Section 2.1 Power Input)
PC Network Wire Type Connections Maximum Length Max. Controls	20 AWG stranded, shielded, twisted pair, 300V minimum rating J7 terminals 1 and 2 (See Section 2.2 PC Network) 1200 Meters (3900 ft.) 31
Module Network and 12V Supply Wire Type Connections Maximum Length Max. Modules/Network	20 AWG stranded, shielded, twisted pair, 300V minimum rating Use wire suitable for at least 90°C J7 terminals 3-10 (See Section 2.5 The Module Network) 107 Meters (350 ft.) 32 4Amp Modules (See each module's specifications for the network under Network Rating)
Alarm (Auto-Dialer) Wire Type Polarity Maximum Length	20 AWG stranded, twisted pair, 300V minimum rating J7 terminals 15 to 18 (See Section 2.3 Alarm System) N/A
Sensor Wire Type Polarity Maximum Length	20 AWG stranded, shielded, twisted pair, 300V minimum rating J7 19 to 26 (See Section 2.4 Sensors) 107 Meters (350 ft.)
Device Modules (Multi, 4A, 15A, Curtain, Cable Inlet, Output)	
Load, Power (VAC Output) Wire Type Polarity	16 AWG stranded (minimum), 300V minimum rating Use wire suitable for at least 90°C See Sections 3.4, 3.5, 4.2, 5.2, 6.2, 7.2 and 8.2

Appendix B

RAPID Specification Sheet**Control Description**

Power Input	120 /240 VAC (108-127/212-254), 0.2/0.1A 50/60 Hz
Environment	0-50°C (32-122°F) non-condensing
Module Power Output	12 VDC unregulated (9.12 VDC - 14.8 VDC), 1.8 Amp
Digital Inputs (2)	5 VDC
Control Network	RS-485
Alarm Outputs (2)	Relay Contact, Normally Open 1.0 Amp @ 120VAC, 2.0 Amp @ 25VDC.
Temperature Sensor Inputs (5)	AD590, resolution: ± 0.1°C
Main Power Fuse	3AG 2/10 Amp slow blow 250V
PCNET Fuses	2AG 1/8 Amp 250V
12V Ground Fuses	2AG 1.5 Amp 250V

Multi Device Module Description

Type	2 - Variable voltage dimmer channels 3 - Relay operated channels
AC Power Input	120 /240 VAC (108-127/212-254), 0.2/0.1A 50/60 Hz
Environment	0-50°C (32-122°F) non-condensing
Variable Channel Output Rating	5 Amps per channel
Relay Channel Output Rating	10 Amps per channel
Module Network	RS-485
Main Power Fuse	3AG 1.0 Amp 250V
Network Rating	1-4Amp module
Network Fuses	2AG 1/8 Amp 250V

4 Amp Module Description

Type	Variable voltage dimmer
AC Power Input	120/208/240 VAC (104-127/187-220/208-254) 50/60Hz
DC Power Input	10-16VDC
Environment	0-50°C (32-122°F) non-condensing
Output Rating	4 Amp
Network Rating	1-4Amp Module
Module Network	RS-485

15Amp Module Description

Type	Variable voltage dimmer
AC Power Input	120/208/240 VAC (104-127/187-220/208-254) 50/60Hz
DC Power Input	10-16VDC
Environment	0-50°C (32-122°F) non-condensing
Output Rating	15A
Network Rating	1-4Amp Module
Module Network	RS-485

Cable Control Module Description

Type	Relay operated
AC Power Input	120/208/240 VAC (104-127/187-220/208-254) 50/60Hz
DC Power Input	10-16VDC
Environment	0-50°C (32-122°F) non-condensing
Rating (Output)	30VDC, 1.6 A (2.8A peak) @ 60 Hz 30VDC, 1.5A (2.8A peak) @ 50 Hz
Module Network	RS-485
Network Rating	4-4Amp Modules
Fuse	3AG 4.0 Amp 250V

Curtain Control Module Description

Type	Relay operated
AC Power Input	120/208/240 VAC 50/60Hz
DC Power Input	10-16VDC
Environment	0-50°C (32-122°F) non-condensing
Network Rating	4-4Amp Modules
Rating (Output)	10A DC
Module Network	RS-485

Output Device Module Description

Type	DC output
DC Power Input	10-16VDC
Environment	0-50°C (32-122°F) non-condensing
Rating (Output)	20mA DC
Network Rating	2-4Amp Modules
Module Network	RS-485

Appendix C

TROUBLESHOOTING GUIDE

Symptom	Check ...
No power to control. DS1 not lit.	<ol style="list-style-type: none"> 1. Breaker 2. Fuse 3. Voltage Selector Switch in correct position.
Calendar/clock incorrect after power loss to control.	<ol style="list-style-type: none"> 1. Remove paper tab under battery. 2. Check battery on control. 3. Verify J6 has jumper on pins 2 and 3
Displays incorrect, erratic temperature.	<ol style="list-style-type: none"> 1. Check that sensors are enabled properly or are disabled if no sensor is connected. 2. Check sensor wiring at the control terminals. Make sure the polarity is correct and wires are in proper terminals. 3. Make sure the control and cable shielding are grounded. 4. Check calibration. Re-calibrate if necessary. 5. Replace sensor.
Alarm doesn't activate.	<ol style="list-style-type: none"> 1. Check the alarm band. Re-adjust if necessary. 2. Run Alarm Test. Listen for clicking action on the alarm relay. 3. Inspect wiring from control terminals to the alarm system. 4. Test alarm device without using the RAPID Control.
Module does not respond, device or load does not respond to RAPID Control.	<ol style="list-style-type: none"> 1. Put the control in TEST and test the device in question. 2. Check module address 3. Check AC power input to the module, using a test light/meter. 4. Check polarity of signal and power supply wires. † 5. Check the load; by-pass the module and power the load directly. 6. If all tests above pass, replace the module. <p>† See SIGNAL TEST, Appendix D.</p>

Appendix D

Paired-Wire Test Instructions**Important:**

The following tests should be performed by a certified electrician. Consult your dealer for further information.

These tests are included to provide assistance for the electrician. They are helpful in confirming that all wiring installation is correct.

This test is performed to ensure that signal is transmitted from the control to the modules. If the module is not responding to commands from the control, it may be possible that the wiring is faulty. To test the signals, a digital or analog multimeter is required:

Testing the 12VDC power supply:

1. Using a digital voltage meter, select the VDC position:
(If the meter does not have an auto-range feature, select the 20VDC range.)
2. Connect the black lead to terminal C on the module.
3. Connect the red lead to terminal D on the module.

With the control power on, the meter should read between +9.0 to +14.0 VDC. This reading indicates that the power supply wiring is correct and functioning properly.

- If the reading is negative (indicated on meter), the wiring has an incorrect polarity. Switch the two wires to correct the polarity. Check meter reading.
- If there is no voltage present at the device, there is either a blown fuse in the control or there is a problem in the wiring.

Testing the Module Network:

1. Use the same setting on the meter as for the power supply test as above.
2. Connect the black lead to terminal A on the module.
3. Connect the red lead to terminal B on the module.

With the control power on, the meter should read between +3.0 to +4.5VDC. Every five seconds the reading will oscillate very quickly to a negative voltage and back for a few seconds after which it will again settle at the 3 to 4.5VDC. This reading indicates that the module network wiring is correct and functioning.

- If the reading is negative (indicated on meter), the wiring has an incorrect polarity. Switch the two wires to correct the polarity. Check meter reading.
- If there is no reading on the meter, for example ≈ 0.0 VDC, there is either a broken wire between the module and the control, or there is a short circuit. Check wiring (test #2).
- **If all tests above pass, and modules(s) fail to respond, replace the module. If replacing the module does not fix the problem consult your dealer.**

Appendix E

Glossary

Address

A combination of switch settings to identify the load of a module.

Ambient Sensor

A sensor used to measure the temperature of the air being used to cool the zones. The outside air temperature.

Area

An area within a zone, such as Creep Area

Auto Dialer

A device that dials a series of phone numbers and plays a recorded message to inform when an alarm has occurred.

Creep Area

An area in a zone, usually at floor level where young pigs are located.

Creep Sensor

A sensor used to measure the temperature in the Creep Area.

Module Network

The 4 wires (network and 12V supply) that run to the modules connected to a RAPID Control. There are 2 Module Networks available per control.

Normally Open Contact

A switch that is open when no alarm condition exists and close when an alarm occurs.

PC

An IBM compatible computer system powered by an Intel Pentium 100 or greater and running Windows 9x or Windows Millenium.

PC-Net

A two wire network that connects all the controls and a PC (if installed) together to allow them to communicate with each other.

Room Sensor

Either a Zone temperature sensor or Creep temperature sensor.

Sensor

A device used to measure temperature.

Terminal

A connection on a module or control where wires are connected to.

Terminal Block

A block made up of a number of terminals.

Zone

A single room that is to be controlled by the RAPID

Zone Area

An area in a zone encompassing the majority or all of the room, excluding the floor area if a Creep Area exists.

Zone Sensor

A sensor used to measure the temperature in the Zone Area.